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CONFIRMED RECORDS OF TWO GREEN STURGEON FROM THE BERING SEA AND GULF OF ALASKA

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ABSTRACT—In the spring of 2006, fisheries observers identified 2 Green Sturgeon specimens in Alaska waters: 1 in the Bering Sea and 1 in the western Gulf of Alaska. These occurrences are noteworthy because the northern range limit for Green Sturgeon is poorly documented, and specimens encountered in northern latitudes could be either North American Green Sturgeon (*A. medirostris*) or Asian Sakhalin Sturgeon (*A. mikadoi*). The specimen collected in the Bering Sea was destroyed, but several morphological characteristics were determined from photographs. The specimen from the Gulf of Alaska was collected and preserved. Morphometric and meristic data from this specimen were compared to published ranges of *A. medirostris* and *A. mikadoi,* as well as the published record of a Green Sturgeon reported from the western Bering Sea in 1953. These comparisons show that the specimen collected in the Gulf of Alaska is *A. medirostris* and suggest that the specimen reported over 50 y ago from the western Bering Sea also may have been *A. medirostris.* Because the specimen recently collected in the eastern Bering Sea was destroyed, its specific identification could not be determined. These findings highlight the need for additional documentation of sturgeon in Alaskan waters.

Key words: Green Sturgeon, *Acipenser medirostris,* distribution, Bering Sea, Gulf of Alaska, Sakhalin Sturgeon, *Acipenser mikadoi*

The Green Sturgeon (*Acipenser medirostris*) is distributed along the Pacific coast of North America from Baja California to Alaska. Although many authors include the Gulf of Alaska, Aleutian Islands, and/or Bering Sea in the range of this species (Miller and Lea 1972; Lee and others 1980; Page and Burr 1991; Mecklenburg and others 2002), there are few documented records from Alaska waters, and the northern limit of this species is poorly known (Mecklenburg and others 2002). This uncertainty is compounded by the fact that Asian populations, known from the Amur River south through the Sea of Japan (Masuda and others 1984), have been variously recognized as conspecific with *A. medirostris* (Berg 1948; Andriashev and Panin 1953; Masuda and others 1984; Houston 1988; Artyukhin and Andronov 1990), as a separate subspecies (*A. medirostris mikadoi*: Schmidt 1950; Lindberg and Legeza 1965; Reshetnikov and others 1997), or as a separate species (*A. mikadoi*: Hilgendorf 1892; Matsubara 1955; Birstein and Bemis 1997; Mecklenburg and others 2002). Recently published genetic evidence (see Birstein and Bemis 1997) suggests that the North American and Asian populations should be recognized as separate species, with the North American species (Green Sturgeon) valid as *Acipenser medirostris* and the Asian species (Sakhalin Sturgeon) valid as *A. mikadoi.* In addition to the genetic evidence, North and others (2002) documented several morphometric differences between Asian and North American populations. We therefore follow Birstein and Bemis (1997) in recognizing the 2 forms as separate species.

Although the presence of Green Sturgeon in the waters of northern British Columbia and Southeast Alaska is well documented (see Mecklenburg and others 2002), there are only 3 specific reliable reports of this species from the Gulf of Alaska and Bering Sea (Fig. 1). Andriashev and Panin (1953) reported a specimen from Olyutorsky Bay in the western Bering Sea. A 2nd specimen, caught in the Naknek River in 1980, is mounted on the wall of the Alaska De-

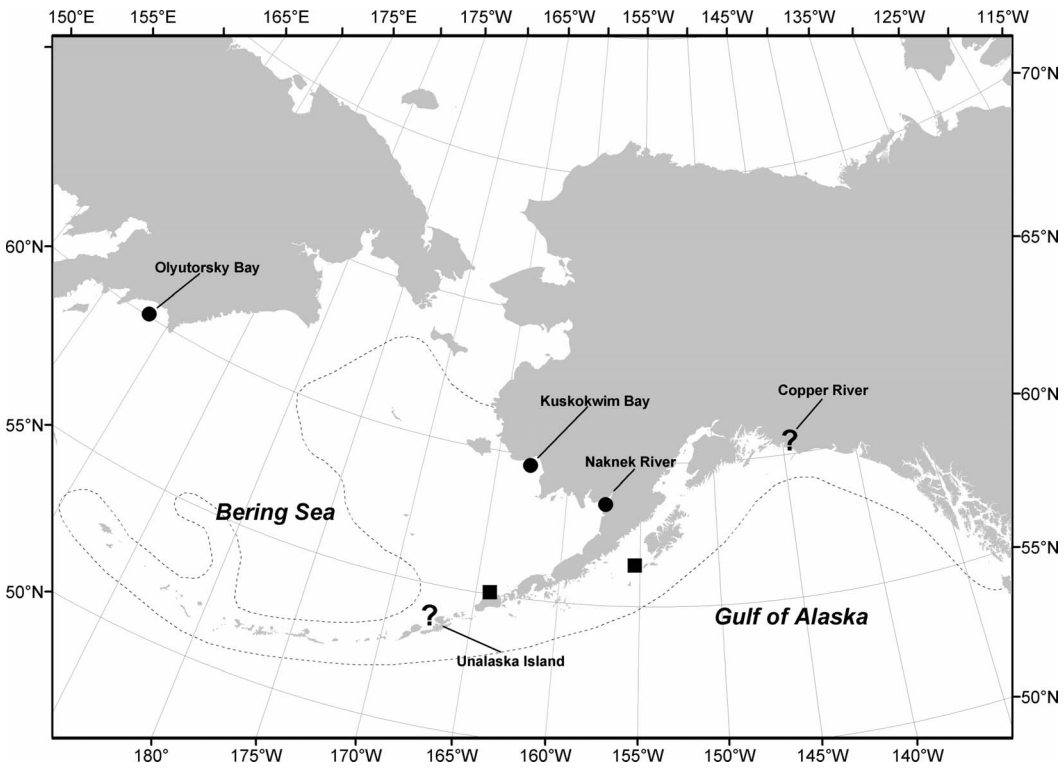

FIGURE 1. Map of sturgeon records from the Gulf of Alaska and Bering Sea. Circles indicate previously published records, squares indicate specimens collected by fisheries observers in 2006, and question marks indicate the non-specific reports of Evermann and Goldsborough (1907) and Wilimovsky (1964). Dashed line represents spatial extent of AFSC catch databases.

partment of Fish and Game (ADF&G) office in King Salmon (Slim Morstad, ADF&G, King Salmon, AK, 22 Jan. 2007, pers. comm.). The 3rd specimen, documented by photographs, was caught at 59°51′N and 162°08′W in Kuskokwim Bay off Kwigillingok on 4 June 2005 (Kitty Mecklenburg, Point Stevens Research, Auke Bay, AK, 11 Nov. 2006, pers. comm.). In addition to these specimens, Evermann and Goldsborough (1907) reported anecdotal evidence of 2 Green Sturgeon caught in the Copper River, and Wilimovsky (1964) listed Green Sturgeon from northwest Unalaska Island (Fig. 1), but specifics were not given in either publication. Because it is not possible to get accurate morphometric data from these specimens or observations, their species identification cannot be determined with any confidence.

The NMFS Alaska Fisheries Science Center (AFSC) maintains 2 databases of fish records from Alaska waters: the Fisheries Monitoring and Analysis (FMA) Division maintains the NORPAC database, which includes all groundfish observer records from domestic fisheries in the Bering Sea, Gulf of Alaska, and Aleutian Islands from 1986 to the present; and the Resource Assessment and Conservation Engineering (RACE) Division maintains RACEbase, which includes catch data from all groundfish resource assessment surveys conducted since the early 1960s. Together these data sets extensively cover Alaska's marine waters from Dixon Entrance in the southeast to Stalemate Bank beyond the far western Aleutian Islands and north to St. Matthew Island in the Bering Sea. Neither database contains a single record of a Green Sturgeon from Alaska waters, so it appears that this species is quite rare in Alaska. However, in the spring of 2006, 2 observers in FMA's North Pacific Groundfish Observer Program reported Green Sturgeon captured during commercial fishing operations in Alaska

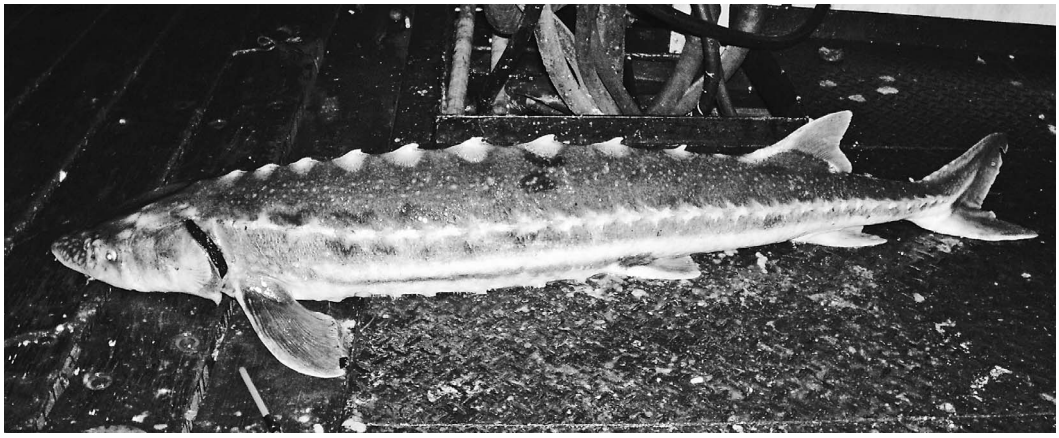

FIGURE 2. Photograph of sturgeon specimen taken on 2 March 2006 in the Bering Sea (Photo by Ryan Braham).

waters. This report summarizes the morphological data obtained from these specimens and compares them to previously published sturgeon data.

Methods

Both specimens were captured during normal fishing operations in 2006. Both vessels were using non-pelagic trawl gear: 1 was targeting Pacific Cod (*Gadus macrocephalus*) and the other rock sole (*Lepidopsetta* spp.). Attempts were made to collect both specimens, but 1 of the 2 was destroyed and was identifiable only through photographs. The other specimen was frozen and shipped to the AFSC in Seattle. Counts and measurements were made on the thawed specimen following the methods of North and others (2002). A tissue sample was removed and stored in 95% ethanol for future genetic analysis. The specimen was then fixed in 10% formalin and deposited at the University of Washington's Fish Collection in Seattle (UW 116336).

Results

Observer Ryan Braham reported the 1st specimen aboard the F/V *Nordic Star* on 2 March 2006 in the southeastern Bering Sea (Fig. 1). The specimen was captured at 55°04′N, 164°10′W, near an area referred to as the ''Slime Bank'', at a depth of 45 m. The observer reported a fork length of 136 cm and a weight of 12.6 kg. He obtained a series of photographs (Fig. 2), but the specimen was subsequently destroyed and was therefore unavailable for examination. The following characteristics were obtained from examination of the photographs: head and body olive green dorsally to below lateral scutes, creamy white ventrally, with narrow green stripe running from above pectoral to pelvic fin; dorsal, pectoral, pelvic, and caudal fins olive green with white leading edge; anal fin creamy white; scutes white; lateral scutes 26; dorsal scutes 9; barbels closer to mouth than to snout. The ventral scute count and the position of the anus could not be determined.

On 24 April 2006, observer Adam Strausbaugh aboard the F/V *Topaz* identified the 2nd specimen in the western Gulf of Alaska. The capture location was 56°30′N, 155°19′W, slightly northwest of the Trinity Islands, at a depth of 47 m (Fig. 1). The observer reported a total length of 145.5 cm and weight of 14.6 kg, and retained the specimen for further examination. The coloration of the specimen before fixation was as follows: dark green dorsally and creamy white below the lateral scutes and on the underside of the head; a broad olive-green stripe extending from above the pectoral fin to just above the pelvic fin; another olive-green stripe running along the ventral midline from the isthmus to the anus; dorsal and pectoral fins olive-green with white leading edge; anal and pelvic fins creamy white; caudal fin white except for olive-green anterior upper lobe; scutes yellowish white; barbels equidistant from the

TABLE 1. Morphometric data and meristic counts for Green Sturgeon (*Acipenser medirostris*) reported here from the central Gulf of Alaska (UW 116336), as well as previously published characters of *A. medirostris* (North and others 2002) and *A. mikadoi* (Sakhalin Sturgeon; Artyukhin and Andronov 1990) and a previously published specimen from the western Bering Sea (ZIN 33033; Andriashev and Panin, 1953).

	UW 116336	*A. medirostris*	*A. mikadoi*	ZIN 33033
Total length (cm)	145.5	125–170	148–180	112
Measurements in % Total Length (TL)				
Head length	19.2	16.2–21.6	22.4–24.3	21.4
Snout length to eye	7.9	5.0–9.9	10.0–12.0	9.3[a]
Postorbital length	11.0	10.2–12.3	10.9–12.1	10.1[a]
Head depth	5.4	5.4–7.8	5.6–6.4	
Body depth	9.5	9.2–13.0	11.9–16.9	
Pectoral length	12.4	10.7–15.4	11.5–13.5	12.6
Measurements in % Head Length (HL)				
Interorbital width	35.4	34.1–42.8	30.8–37.1	34.4
Snout to barbels	18.4	12.4–24.8	26.2–30.7	22.9
Barbels to mouth	26.5	21.3–29.3	17.8–21.3	
Snout width @ barbels	29.5	27.2–36.6	28.7–35.1	
Snout width @ mouth	45.9	43.7–59.6	35.7–45.4	
Meristics				
Dorsal scutes	11	7–12	8–11	10
Lateral scutes	29	22–33	26–33	25–26
Ventral scutes	11	5–12	5–10	10
Dorsal-fin rays	39	35–44	29–44	40
Anal-fin rays	28	21–32	19–27	27
Gill rakers	18	15–26	18–21	22

[a] Originally reported as % HL, converted here using ratio of HL:TL.

mouth and tip of the snout; and anus slightly anterior to the pelvic-fin insertion.

Morphometric data for the specimen collected in the Gulf of Alaska all fall within the range reported by North and others (2002) for Green Sturgeon, while the majority of these measurements (7 of 11) fall outside the range reported by Artyukhin and Andronov (1990) for Sakhalin Sturgeon (Table 1). Meristic data for the Gulf of Alaska specimen also all fall within the range for Green Sturgeon, while counts of ventral scutes and anal-fin rays fall slightly outside the range for Sakhalin Sturgeon (Table 1).

DISCUSSION

These 2 occurrences of Green Sturgeon in Alaska waters are noteworthy because of the rarity of reliable records in this part of the species range and because of questions about their continent of origin. According to North and others (2002), North American Green Sturgeon (*A. medirostris*) can be distinguished from Sakhalin Sturgeon (*A. mikadoi*) on the basis of differences in head length, snout length (to eye and to barbels), and distance from barbels to mouth. These morphometric characters, as well as measurements of head depth, body depth, snout width at mouth, and ventral scute count all indicate that the specimen collected in the Gulf of Alaska should be identified as *A. medirostris.*

Unfortunately, the specimen encountered in the southeastern Bering Sea was not collected, so morphometrics and most meristics could not be obtained for this specimen. It can be positively identified as either *A. medirostris* or *A. mikadoi* on the basis of coloration, lateral scute count, and dorsal scute count. However, these characteristics are not useful for distinguishing *A. medirostris* from *A. mikadoi,* so its specific identity is impossible to determine.

The ''Green Sturgeon'' that Andriashev and Panin (1953) reported from the Bering Sea (ZIN 33033) was collected in Olyutorsky Bay, near the west coast of the Kamchatka Peninsula. This specimen was captured in Russian waters, and yet several of the characteristics the authors reported, including lateral scute count, head length, snout length, and snout to barbel distance (Table 1), align more closely with those reported for North American specimens by North and others (2002) than with those re-

ported for Asian specimens by Artyukhin and Andronov (1990). These discrepancies may be partially due to differences in measurement protocols, as well as the limited number and geographic range of the specimens represented in Table 1. However, this comparison does suggest the possibility that the Olyutorsky Bay specimen may have been a Green Sturgeon and not a Sakhalin Sturgeon.

The records summarized here provide further evidence that ''Green Sturgeon'' do occasionally venture into the Gulf of Alaska and even into the Bering Sea. Furthermore, if the morphometric characteristics noted by North and others (2002) are reliable for differentiating *A. medirostris* from *A. mikadoi,* then the range of *A. medirostris* may extend into the western Bering Sea. This possibility highlights the need for additional collections of sturgeon specimens from northern waters including tissue samples suitable for DNA analysis. The utility of morphometric characters for definitively distinguishing *A. medirostris* from *A. mikadoi* ultimately depends on the continued acquisition of data from larger numbers of specimens throughout the geographic range of both species.

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